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Running Title: The spread of pharmaceutical care across Europe

Abstract

Rationale, Aims & Objectives: Pharmaceutical care involves patient-centred pharmacist activity to improve medicines management by patients. The implementation of this service in a comprehensive manner, however, requires considerable organisation and effort and indeed it is often not fully implemented in care settings.

The main objective was to assess how pharmaceutical care provision within community pharmacy has evolved over time in Europe.

Method: A cross-sectional questionnaire-based survey of community pharmacies, using a modified version of the Behavioural Pharmaceutical Care Scale (BPCS) was conducted in late 2012/early 2013 within 16 European countries and compared with an earlier assessment conducted in 2006.

Results: The provision of comprehensive pharmaceutical care has slightly improved in all European countries that participated in both editions of this survey (n=8) with progress being made particularly in Denmark and Switzerland. Moreover, there was a wider country uptake, indicating spread of the concept. However, due to a number of limitations, the results should be interpreted with caution. Using combined data from participating countries, the provision of pharmaceutical care was positively correlated with the participation of the community pharmacists in patient-centred activities, routine use of pharmacy software with access to clinical data, participation in multi-disciplinary team meetings and having specialised education.

Conclusion: The present study demonstrated a slight evolution in self-reported provision of pharmaceutical care by community pharmacists across Europe, as measured by the BPCS. The slow progress suggests a range of barriers which are preventing pharmacists moving beyond traditional roles. Support from professional bodies and more patient centred community pharmacy contracts, including remuneration for pharmaceutical care services, are likely to be required if quicker progress is to be made in the future.

Keywords: pharmaceutical care; implementation; Europe; medication review; pharmacy services; medicines use

Introduction

Within the context of pharmacy practice, during the last two decades, increased attention has been focused on the change in the community pharmacist's role from product-focused to more patient-focused activities. With continued efforts to improve patient health outcomes, and in response to the challenge of a patient-focused approach, the concept of pharmaceutical care was developed in the US[1] and was quickly adopted as "good pharmacy practice" internationally[2].

Delivery of pharmaceutical care has important demands on structure and process of the delivery of services in community pharmacies[3]. Different countries, according to the country-specific practice culture and systems of health delivery, have adopted pharmaceutical care services in different forms that match the local situation needs and which take into account various barriers and facilitating factors[3]. The concept of pharmaceutical care is complex and has continued to evolve over the years with many different definitions appearing in the literature. In an attempt to harmonise definitions, the board of the Pharmaceutical Care Network Europe (PCNE) reached a consensus on a PCNE definition of Pharmaceutical Care, stating that it "is the pharmacist's contribution to the care of individuals in order to optimise medicines use and improve health outcomes"[4].

A number of barriers have been identified internationally which have hindered the implementation of comprehensive pharmaceutical care programmes within community pharmacies, including: limited time, lack of reimbursement for the extra time required to deliver the service, high work load, inadequate competency and lack of commitment[5-8]. To facilitate the implementation of pharmaceutical care in the community pharmacy setting there is a need to build good relationships with general medical practitioners (GPs), to receive financial compensation for the service, to have the appropriate premises (e.g. private counselling area), to have appropriate and sufficiently trained staff, to have a high degree of co-ordinated teamwork and an ability to receive external guidance[9]. A conscious effort from individual pharmacists to deliver pharmaceutical care programmes and/or

legislation that redefines the role the pharmacist is required to facilitate pharmaceutical care implementation[10].

Although the effectiveness of pharmaceutical care delivery has been largely defined in the context of research studies[11], quantification of the service provided under everyday care conditions is important. A few studies describe the influence of the policy context in the implementation of services[12], whilst others focus on structural influences, such as the existence of software capable of uploading identified drug-related problems into a national database[13]. The usual method to assess the provision of pharmaceutical care deployed in a large number of pharmacies is by the use of survey methodology, using a validated data collection instrument. Survey methodology compromises much of the pharmacy practice research literature corpus; it is surprising, however, that only a relatively few studies have assessed the degree of provision of pharmaceutical care in community pharmacies[10, 14-21].

The main aim of the present study was to assess the current degree of provision of pharmaceutical care by community pharmacists across Europe and to determine whether the degree of implementation had changed since 2006.

Methods

The provision of pharmaceutical care by community pharmacists across Europe was assessed through the co-operation of the Pharmaceutical Care Network Europe (PCNE, www.pcne.org). Having achieved the agreement of PCNE members from different European countries to participate, data were collected from 16 countries (Bosnia, Denmark, England, Germany, Italy, Lithuania, Malta, Moldova, the Netherlands, Northern Ireland, Norway, Portugal, Serbia, Spain, Sweden and Switzerland), with ethical approval being achieved as required by local regulation. Belgium and the Ukraine engaged with the initiative but due to logistical reasons data collection/validation was delayed and has not been included in the analysis.

Questionnaire/Instrument

A validated instrument, with two separate sections, was used[10,14]. Section A collected data on pharmacists' demographics and pharmacy services and layout. Section B evaluated the types of services provided to the last patients using the pharmacy (5 or 10) referring to a specific time period (2 or 6 weeks) using vignettes from a slightly modified version of the BPCS. The vignettes describe different situations *e.g.* dealing with a first prescription or repeat dispensing. The BPCS comprises 34 items, which contribute to 3 domains, direct patient care activities (DPCA), referral and consultation activities (RCA) and instrumental activities (IA). This questionnaire has been previously used by researchers to assess the provision of pharmaceutical care by community pharmacists in Northern Ireland and then in a study across Europe[10,15]. The questionnaires were distributed late 2012/early 2013 i.e. the current survey is referred to throughout paper as 2013.

Data collection

The study was coordinated by Queen's University Belfast and used PCNE to identify country coordinators. The country coordinators were responsible for determining the most effective manner to reach one pharmacist per pharmacy (i.e. pharmacist most involved in patient care activities) and they were informed on the sample size considered representative of their country, considering a confidence interval of 95%, a 3% error and a prevalence of the phenomenon (provision of Pharmaceutical care) ranging from 4.8% to 25%, according to results from the previous study[10]. In countries that had not participated in the previous round, the lowest prevalence was considered, unless a national study could be used as reference (e.g. Spain). The method of distribution varied from country to country according to the available resources and research practice, *i.e.* online, face-to-face or via regular post. Most countries used an online survey method (Table 1).

Data entry and analysis

Data entry was the responsibility of each country coordinator, guided by a standard operating procedure to ensure quality[22]. Data obtained from the surveyed countries were

uploaded into SPSS v19 for detailed statistical analysis and sent to the study coordinator. Standard statistical methodologies were used in the assessment of the provision of pharmaceutical care by community pharmacists. Descriptive statistics were used to summarise the data of all participating countries. Multiple pair-wise comparisons were carried out to compare the total and BPCS dimension scores between the participating countries. A Bonferroni adjustment for multiple comparisons was carried out. Dimension and total BPCS scores were also compared between the countries that participated in both editions of the survey (2006 v 2013), using the Wilcoxon test[10]. Pharmacist and pharmacy characteristics were explored for their association with the total BPCS scores, using combined data from all participating countries. Multiple linear regression modelling was used to identify factors contributing to the level of implementation as determined by the BPCS score. Statistical significance was set at p=0.05. As in previous research utilising the BPCS survey instrument, pharmacists who achieved a top quartile total BPCS score were categorised as providers of pharmaceutical care whereas pharmacists scoring in the bottom 25% were categorised as non-providers at the country level. Therefore the cut-off values used varies across countries.

Results

Response rate & practice demographics

In eleven countries, the sample reached surpassed the estimated representative sample size. Countries below the estimates were Denmark, England, Malta, Northern Ireland and Switzerland. The response rate was considered too low for England to be valid and England was therefore removed from the comparative analysis. The remaining countries were included in the comparative analysis, however, significant caution should be used in interpretation of the data due to possible unrepresentativeness of the respondent sample (Table 1).

The responding community pharmacists were more commonly (>50%) females in all of the surveyed countries except Italy, the Netherlands and Northern Ireland. Pharmacies had been instructed that the pharmacist with the most patient contact should take the lead in

the survey, resulting in >60% of responding pharmacists with more than 5 years of experience in community pharmacy in all surveyed countries.

Variations in pharmacy practice settings

A wide distribution in the type and location of the pharmacies was noted in the surveyed countries. Pharmacy type ranged from 100% independent in Denmark, Germany and Spain to 89.6% large multiple in Serbia and 90.3% in Norway (Table 2).

It was common for one f*ull-time equivalent (FTE)* pharmacist to work in each pharmacy in England, Malta, the Netherlands and Northern Ireland whereas the remainder of the surveyed countries had two or more pharmacists working in each pharmacy. In Sweden, 46% of the respondents were "prescriptionists", holding a BSc (Pharm) degree, while the remainder were pharmacists with a MSc (Pharm) degree. In all of the surveyed countries (except in Denmark, Germany, Norway, Serbia and Switzerland) there was, on average, two or fewer dispensing support staff working in the pharmacies. In half of the surveyed countries, the pharmacies on average dispensed >200 prescription items per day, while <200 items per day were dispensed in Bosnia, Germany, Italy, Lithuania, Malta, Moldova, Spain and Switzerland. A weak but significant correlation was noted between the number of prescription items dispensed per day and the number of FTE pharmacists (Spearman's rho = 0.292; $p<0.001$) and FTE dispensing staff (Spearman's rho = 0.328; $p<0.001$).

In all surveyed countries, apart from the Netherlands, less than 50% of respondent pharmacists participated in multi-disciplinary team meetings. Private consultation areas were present to a large extent in pharmacies in all of the surveyed countries, with the exception of Lithuania, Moldova and Serbia. Most of the surveyed countries, except in Lithuania, Moldova and Serbia, routinely used customised pharmacy software to assist with the dispensing process. The extent of the use of software to check clinical data, drug interactions and contraindications by community pharmacists varied across the surveyed pharmacies. In all the surveyed countries, fewer than 50% of responding pharmacists indicated that patient-level clinical data were available via a shared database with the hospital or the GP. More than 25% of responding pharmacists, however, judged that these

clinical data were easily accessed if required. Responding pharmacists participated in patient-centred services such as health screening, patient monitoring, medication review, and health promotion/education to a high extent in most surveyed countries, except for Moldova. A low participation was also found for Lithuania, Sweden and Denmark, with the exception made to medication review. Italy was actively engaged in two of these services (health promotion and education) but very little in the other services. It is also worth pointing out that in the Netherlands over 90% of responding pharmacists stated that they were engaged in medication review. Medication review was the most cited service by three of the surveyed countries: The Netherlands, Germany and Denmark (Table 2).

BPCS scores

The BPCS scores for each country are presented in Table 3. In the Netherlands survey, one of the items in the questionnaire from the referral and consultation dimension was inadvertently missed out; it was therefore not possible to calculate this dimension score and the total BPCS score for this country.

The highest mean total BPCS scores were achieved by pharmacists from Switzerland (82.7/160) and Spain (80.2/160). Total BPCS scores achieved in Switzerland were significantly higher ($p<0.05$) than in the other surveyed countries. Moldova's pharmacists scored the lowest mean total BPCS score (47.0/160). Graphical representations of the total and BPCS scores are presented in Figure 1. Lines have been inserted in the Figure at the BPCS scores of 50 and 70 which helps highlight the stage of evolution in each country towards comprehensive pharmaceutical care provision.

Switzerland also achieved a high mean score for the direct patient care activities dimension (41.5/85), with the Netherlands, Portugal and Germany also scoring highly in this dimension (34.8, 34.7 and 33.0/85). The lowest mean direct patient care activities dimension score was achieved in Moldova (13.4/85).

The highest mean referral and consultation activity dimension score was noted in Denmark and Spain (28.7 and 28.6/40), while the lowest score in this dimension was

achieved in Moldova (16.3/40). Referral and consultation activity scores achieved in Spain were significantly higher ($p<0.05$) than in other countries.

The highest mean instrumental activity dimension score was noted in the Netherlands (26.6/35), while again the lowest score was achieved in Moldova (17.3/35). Instrumental activity scores achieved in the Netherlands were significantly ($p<0.05$) higher than in the other surveyed countries.

Providers and non-providers of pharmaceutical care

In accordance with the original questionnaire designers[14], at country level, pharmacies achieving BPCS scores within the top 25% were considered providers of pharmaceutical care while those in the bottom 25% were considered non-providers (Table 4).

Evolution of pharmaceutical care provision over time

Total BPCS scores remained static or evolved positively, although in some cases marginally, over time for the countries that engaged (between the 2006 and 2013 surveys) i.e. Denmark, Germany, Malta, Northern Ireland, Portugal, Sweden and Switzerland. Denmark and Switzerland were the only two countries which achieved a step change in the total score achieved.

Direct patient care activity scores obtained in the 2013 study were significantly higher ($p<0.05$) than those achieved in the 2006 survey. Referral and consultation dimension scores in the present study were, however, significantly lower ($p<0.05$) than those obtained in the 2006 survey. No significant differences between 2006 and 2013 data were noted for the instrumental activity scores (Table 5).

Factors associated with pharmaceutical care provision

Thirteen variables were investigated as factors associated with the mean total BPCS scores achieved using combined data from all of the countries surveyed in 2013. Variables that

showed a trend of association with the total BPCS score were identified through an initial multiple linear regression model. Significant variables obtained from this model were entered into a final linear regression model. A ten-variable model was constructed explaining 40% of the variability of the outcome (total BPCS score). The most influential variable in the model which was positively associated with high total BPCS scores was participation in medication review (Table 6).

Discussion

Patient-centred care provision has been proposed as a means to address the challenges of medication-related problems, including ensuring high medication appropriateness and medication adherence to prescribed treatments and associated life-style factors[23]. Pharmaceutical care has been viewed as one of the most important roles of the pharmacist and, when appropriately implemented, has been shown to have a positive impact on patient health outcomes[11]. The present study assessed the provision of pharmaceutical care by community pharmacists across Europe.

The pharmaceutical care concept has been in place for a considerable time (since early 1990s), and progressive evolution seems to be happening in Europe. Countries that have implemented the concept over a long period, are improving. On the other hand, it is clear that countries which until recently had more traditional roles are becoming more aware of pharmaceutical care, by their expressed desire to join the research programme and perhaps as a result of both national and international bodies investing in their full integration in Europe. It is worth noting, that although the scores for the Eastern Europe countries were quite low, there was considerable variability among them, perhaps as a result of different policy measures being adopted.

Response rate

The response rate to a questionnaire is an important issue, as a low rate can increase the risk of bias in the answers received[24]. The response rate varied from 1.6% in Spain (but since 346 pharmacies participated, the sample exceeded the minimum estimated sample

size required) to 99.0% in Bosnia. The differences in the response rates between countries can be attributed to the different survey distribution methodology used (online, postal or face-to-face interview) as well as the variable involvement of national organisations able to motivate response. However, more important than the sample size is its representativeness, assessed by how number of responses compares with national data. On this aspect, it should be noted that the presence of selection bias cannot be disregarded for Sweden, judging by the proportion of pharmacists versus prescriptionists among the respondents, compared to their proportions within the community pharmacy work force. In addition a much lower response rate was achieved in Sweden in the second assessment (28.4%; 2013) than in the first survey (70.9%; 2006).

Demographics & practice characteristics

Community pharmacists from most European countries frequently provided additional services and used computer software routinely when dealing with individual patients. Of note there was a marked increase in the percentage of pharmacies in a number of European countries (N. Ireland, Portugal, Sweden and Switzerland) having a private consultation area when compared with findings from the 2006 study[10]. This provides a basis/facilitator for high quality clinical care for patients which can be seen as a positive advancement from the 2006 study.

Provision of pharmaceutical care

The present study showed that the mean score for the community pharmacists across the surveyed European countries was 69.3/160 (43.3%). The total BPCS scores achieved across different European countries ranged from 47.0 (Moldova) to 82.7 (Switzerland). These findings suggest that the provision of pharmaceutical care by community pharmacists still remains limited across Europe. Individual studies across other countries, including the US, Denmark, Spain, Northwest China and Jordan, have also highlighted the issue of low provision of pharmaceutical care by community pharmacists[14, 16-21].

Lack of time and resources has repeatedly been found as the main reasons for the lack of provision of comprehensive pharmaceutical care in the community pharmacy setting internationally[5,6,9,25]. Other studies have suggested that lack of commitment among pharmacy practitioners to pharmaceutical care as a major barrier for implementation[8]. Although not specifically examined in the present study, it is likely that these remain major barriers. In addition, due to the variability between results for individual pharmacies within each country, the present findings indicate a lack of standardised policies and/or procedures for the delivery of pharmaceutical care.

In order to promote a more patient centred approach to pharmacy practice, a number of motivators for the provision of pharmaceutical care have been put into place in a number of European countries in the period covered by the overall study (2006-2013)[3]. In Northern Ireland, for example, a number of patient-centred services have been commissioned by the nationalised health service which include a medicines management initiative, repeat prescription scheme, minor ailments scheme, smoking cessation service and advice to nursing and residential homes (HSC Business Service Organisation web site; http://www.hscbusiness. hscni.net/services/1944.htm). In Portugal, pharmacists have been remunerated for the provision of additional services to patients with diabetes[26]. A system for the documentation of medication-related problems has been available in all community pharmacies in Sweden[3,13]. Reimbursement for certain elements of pharmaceutical care has been agreed in the Netherlands, Switzerland, Germany and in Great Britain[27]. To promote best practice, the Royal Pharmaceutical Society of Great Britain has launched an early adopter programme which specifically addressed 'keeping patients safe when they transfer between care providers' with a focus on medicines management across interfaces[28]. Such early adopter programmes, in which pioneer pharmacists initially provide and refine new care delivery approaches, promotes the application of new care models into routine practice[29].

However, when compared with the results reported in the 2006 survey[10], the mean total BPCS scores improved for several countries. Although differing response rates may have been at least in part responsible for the improvements in some countries, the results seem highly plausible. For instance, in Portugal, the fact that pharmaceutical care has been

legally recognised in 2007 cannot be disregarded[30]. Moreover, in Switzerland, the introduction of remunerated medicines use review in 2010 is very likely to have driven the observed increase[31]. In Germany, the development of a nationwide service in medication review was launched in 2011; since then, two main studies have been rolled out, the ARMIN study, which runs in two states and is being remunerated (www.arzneimittelinitiative.de) and the ATHINA study, which currently is still not remunerated. The sharp increase observed in Denmark also seems consistent with data reported elsewhere, influenced by various ongoing projects[32].

In general, Direct Patient Care Activity scores were higher in the present study, whilst the Referral and Consultation Activities decreased compared to the 2006 study. The latter finding, if viewed from an optimistic perspective, may be seen as a positive result. The decrease in referral might reflect a more active and independent approach by pharmacists in solving drug related problems and care issues, perhaps supported by system changes, increased availability of private consultation rooms and the introduction of a number of recognised remunerated services.

The differences in domain, dimension and total scores between countries represent heterogeneity in the primary care systems across Europe as well as the lack of harmonised policies and procedures for the delivery of pharmaceutical care[30,33]. A trend of low provision of patient assessment, documentation activities, implementation of therapeutic objectives and monitoring plans, and direct patient activities overall was noted in the surveyed European countries. This low provision is associated with tasks that are time consuming. The low level of documentation of activities is considered particularly problematic, since in the absence of documentation, follow-up is difficult, *i.e.* without benchmark data and without therapeutic objectives or monitoring plans being recorded. Moreover, lack of documentation will ultimately delay or even be a barrier for successful negotiation of remuneration, as evidence of the impact of the service cannot be gathered.

The present study confirmed that a number of pharmaceutical care activities have been implemented into daily practice including screening activities, patient counselling, medication review, verification of patient understanding and the use of a private area for

patient counselling. However, many activities were lacking in countries with less developed pharmacy systems (e.g. Moldova and Lithuania). These findings are in line with the results reported across Europe in 2006 and in the earlier Northern Irish results of 1996[10,15].

Providers versus non-providers of pharmaceutical care

The present study showed that the percentage of respondents who were judged to be providers of pharmaceutical care, using the methodology suggested by Odedina and colleagues[14] (top 25% of BPCS scores), was less than those deemed non-providers (bottom 25% of BPCS scores) in the European countries.

Pharmaceutical care is of course not a service delivered by a pharmacist in isolation from other healthcare professions. Participation in multidisciplinary meetings can help build professional relationships and help in the initiation of discussions about different patient cases. This type of activity has also been documented as a facilitator to pharmaceutical care, with a particular emphasis on relationships with physicians[9]. In addition, pharmaceutical care delivery is expected to be enhanced when related services such as health screening, patient monitoring, medication review and health promotion/education are delivered within the pharmacy. This association was noted in both the present study and the 2006 study. The importance of appropriate software cannot be overemphasised as this can aid in the decision making and in the documentation of different services. Access to medical notes/clinical information is of paramount importance in the delivery of comprehensive pharmaceutical care, and limited access to patient medical details has been identified by others as a barrier to the provision of pharmaceutical care[25]. Findings from the present study (having a postgraduate qualification in pharmacy and a high number prescription items dispensed in an average day) were also highlighted as facilitators to pharmaceutical care provision in a US study[16]. This latter study found that the predictors for pharmaceutical care service provision included pharmacists holding a postgraduate

qualification, the pharmacy being located in a clinic, the pharmacy being independent and a high number of prescriptions dispensed per day[16].

It should be acknowledged that the slow evolution in the provision of pharmaceutical care, is unlikely to change without significant intervention at the system level (*e.g.* new community pharmacy contracts), with adequate remuneration for patient-centred services. Gathering evidence at the national level, coupled with lobbying activities should be influential in changing policy, ultimately leading to improved practice.

Limitations

The different survey methodology approaches, coupled with low response rates achieved in a number of countries, represent the major limitation of this study indicating that results may not be generalizable, due to a likely selection bias. Furthermore, the provision of pharmaceutical care was self-reported and self-rated, which may lead to over reporting of good practice initiatives.

Conclusions

The present study demonstrated the evolution in self-reported provision of pharmaceutical care by community pharmacists across Europe, as measured by the total BPCS scores. Community pharmacists' provision of pharmaceutical care across Europe was positively associated with participation in additional services (health screening, patient monitoring, medication review and health promotion/education); participation in multidisciplinary team meetings; routine use of pharmacy software when checking clinical data and drug-drug interactions; access to clinical data (clinical data available through shared database/easily accessed); postgraduate qualifications in pharmacy; working in a pharmacy that has a private patient consultation area; and a high number of prescription items dispensed on an average day. Scores obtained by new European countries suggest they are at a later stage of implementation. The BPCS tool has proven to be useful in

detecting changes over time despite the limiting factors. New approaches to enhance recruitment into future surveys, for example, providing a reward for completion, could be used to help encourage a higher uptake, thus avoiding selection bias.

Author contribution: This project was initiated by James McElnay and Tommy Westerlund and the project delivery team was chaired by James McElnay. The data analysis and initial manuscript were performed by Ghaith Al- Tanni, Ahmed F. Hawwa, Claire Scullin and James McElnay; the manuscript was finalized by Filipa Alves da Costa, Kurt E Hersberger and Tommy Westerlund. The other authors were members of the PCNE BPCS Project Team who led the survey in their respective countries.

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Table 1 Response rate to 2013 BPCS survey administration across European countries

Country	Survey methodology	Number of existing pharmacies	Prevalence considered[1] (%)	Sample estimated (n)	Respondents (n)	Response rate (%)
Bosnia	Online	100	4.8	66	99	99.0
Denmark	Online	300	4.8	118	90	30.0
England	Online	9,225[2]	9.9	337	78	0.9
Germany	Online	5,968	21.5	643	722	12.1
Italy	Online	17,000	4.8	193	807	4.7
Lithuania	Face to face interview	1,370	4.8	171	227	16.6
Malta	Postal	213	11.6	143	83	39.0
Moldova	Online and postal	400	4.8	131	315	78.8
Netherlands	Online	1,966	4.8	178	209	10.6
Northern Ireland	Postal	549	25.0	326	150	27.3
Norway	Postal	679	4.8	152	257	37.8
Portugal	Online	2,937	17.4	508	686	23.4
Serbia	Postal	528	4.8	143	374	70.8
Spain	Online	21,458	9.0	344	346	1.6
Sweden	Online	1,318	6.2	209	375	28.4
Switzerland	Online	1 ,757	22.4	522	390	22.2

[1]The prevalence value was obtained from results of the 2006 study. For those not participating in the 2006 study, the lowest level of implementation was used.
[2]Link to the online survey included in general pharmacy correspondence.

Table 2 Demographic and practice characteristics (expressed in percentages) of the responding pharmacists (across Europe, 2013)

Characteristics	Bosnia	Denmark	Germany	Italy	Lithuania	Malta	Moldova	Netherlands	N. Ireland	Norway	Portugal	Serbia	Spain	Sweden	Switzerland
Gender															
Male	46.5	15.7	49.2	62.9	5.3	27.7	7.9	56.0	51.3	16.7	27.2	9.1	35.5	15.2	42.3
Female	53.5	84.3	50.8	37.1	94.7	72.3	92.1	44.0	48.7	83.3	72.8	90.9	64.5	84.8	57.7
Missing	0.0	1.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	1.8
Years of experience in community pharmacy															
≤5 years	4.0	37.1	8.7	2.0	12.9	31.3	19.4	14.8	16.2	24.1	33.4	24.1	15.1	35.4	8.8
6–10	11.1	23.6	12.2	5.6	11.0	13.3	23.8	19.1	27.0	26.8	26.4	23.8	20.9	18.5	10.4
11–20	37.4	13.5	33.1	21.9	16.8	37.3	25.1	31.1	27.0	24.1	28.8	24.9	32.8	16.9	29.6
>20	47.5	25.8	46.1	70.5	59.4	18.1	31.7	34.9	29.7	24.9	11.3	27.3	31.3	29.2	51.2
Missing	0.0	1.1	1.1	0.0	31.7	0.0	0.0	0.0	1.3	0.0	2.3	0.0	0.3	0.5	1.3
Type of pharmacy															
Independent	43.4	100.0	53.7	76.7	17.6	74.7	7.1	53.1	52.7	9.7	78.3	0.3	100.0	15.7	35.1

Small multiple (5–10 pharmacies)	56.6	0.0	8.0	23.3	3.1	24.1	9.6	11.5	8.0	0.0	21.7	10.2	0.0	2.7	5.6
Large multiple (>10 pharmacies)	0.0	0.0	38.2	0.0	79.3	1.2	83.3	35.4	39.3	90.3	0.0	89.6	0.0	81.6	59.2
Missing	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
Location of the pharmacy															
Rural	0.0	11.6	37.5	44.2	1.3	20.5	6.4	20.1	28.9	0.0	23.0	13.6	41.4	12.8	32.3
Suburban	33.3	14.0	23.0	23.9	40.5	20.5	9.9	22.0	24.2	0.0	25.7	11.8	40.8	9.6	22.6
City or Town Centre	60.6	73.3	16.9	31.8	54.6	59.0	78.0	21.5	43.0	0.0	51.3	56.4	12.0	54.4	34.9
Health Centre	6.1	1.2	22.6	0.0	3.5	0.0	5.8	36.4	4.0	0.0	0.0	18.2	5.8	23.2	10.3
Missing	0.0	4.4	0.0	0.0	0.0	0.0	0.6	0.0	0.7	100.0	1.9	0.0	10.7	0.0	0.0
No. of pharmacists who work in the pharmacy (FTE)															
1	9.1	5.7	29.9	17.1	36.2	63.9	1.3	63.2	62.4	8.0	10.2	36.2	30.5	6.0	24.4

2	19.2	27.3	48.7	29.5	36.7	28.9	10.3	29.2	28.2	30.7	34.4	25.5	41.9	15.3	56.3
3	16.2	42.0	15.0	20.9	14.3	6.0	62.8	5.7	5.4	36.5	28.8	13.1	19.5	26.7	15.2
≥4	55.6	25.0	6.3	32.5	12.9	1.2	25.6	1.9	4.0	24.8	26.6	25.2	8.1	52.0	4.1
Missing	0.0	2.2	1.4	0.0	7.5	0.0	0.0	0.0	0.7	46.7	4.2	0.3	0.6	2.1	0.3
No. of skilled staff in the pharmacy (FTE)															
0	0.0	0.0	2.3	46.8	24.3	32.5	93.9	85.6	9.5	9.2	7.7	8.0	21.0	39.4	0.8
1	20.2	2.5	23.7	32.1	39.2	34.9	4.8	12.9	31.3	19.1	22.2	20.9	38.6	27.2	7.2
2	44.4	0.0	33.7	16.9	24.3	24.1	1.3	1.0	27.9	26.2	31.1	24.4	27.4	15.9	19.8
3	15.2	2.5	22.4	2.9	4.5	6.0	0.0	0.5	16.3	12.8	21.1	17.7	10.9	9.2	24.2
≥4	20.2	95.1	18.0	1.4	7.7	2.4	0.0	0.0	15.0	32.6	17.8	29.0	2.1	8.4	47.9
Missing	0.0	10.0	1.7	0.0	2.2	0.0	0.3	0.0	2.0	45.1	3.5	0.3	4.9	1.1	0.5
Pre-registration student engaged in the pharmacy															
Yes	44.4	50.0	16.1	29.6	22.0	41.5	5.1	12.9	40.1	24.1	24.7	34.6	17.3	15.7	18.3
Missing	0.0	4.4	1.1	0.0	0.0	1.2	0.0	0.0	2.0	0.0	2.2	1.9	1.2	0.0	0.5
No. of prescription items dispensed per day															
0-99	75.8	3.3	19.2	38.8	78.8	96.4	15.1	1.0	7.5	15.7	9.6	31.6	31.3	14.9	35.3

100–199	15.2	1.7	37.6	45.8	15.9	3.6	71.5	5.7	25.2	32.6	35.3	16.1	38.3	31.0	28.4
200–299	6.1	0.0	26.3	13.1	1.0	0.0	13.5	16.7	18.4	29.8	25.9	11.0	19.9	22.8	14.5
≥300	3.0	95.0	16.9	2.2	4.3	0.0	0.0	67.6	49.0	21.9	29.2	41.2	10.4	31.3	21.8
Missing	0.0	33.3	11.5	0.0	8.4	0.0	1.0	0.0	2.0	5.8	4.2	5.3	8.7	1.9	2.6
Responding pharmacist has a postgraduate qualification in pharmacy															
Yes	52.5	69.6	54.2	5.5	2.2	9.6	0.0	85.2	8.1	9.0	20.4	8.8	37.8	5.9	58.2
Missing	0.0	23.3	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.4	2.0	0.3	2.0	0.3	0.0
Responding pharmacist participates routinely in multidisciplinary team meetings															
Yes	42.4	31.4	25.3	35.4	56.8	27.7	2.5	97.6	15.4	15.4	16.6	19.7	23.5	4.0	25.9
Missing	0.0	22.2	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.6	2.5	2.1	1.4	0.3	0.0
Pharmacy has a private consultation area															
Yes	68.7	49.3	82.8	71.1	6.6	68.7	1.3	97.6	72.7	91.8	92.6	31.8	77.9	54.0	85.4
Missing	0.0	23.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.7	1.6	2.0	0.0	0
Use pharmacy software routinely when checking clinical data															
Yes	50.5	15.3	43.4	7.9	5.7	48.2	0.0	100.0	69.8	51.0	44.6	30.0	41.6	49.2	57.2
Missing	0.0	20.0	0.8	0.0	0.0	0.0	0.3	0.0	0.7	0.0	3.2	4.5	0.0	0.3	0

Use pharmacy software routinely when checking drug-drug-interactions															
Yes	47.5	69.4	98.8	56.5	22.9	56.6	0.0	100.0	88.0	98.0	94.7	29.5	86.7	78.1	98.5
Missing	0.0	20.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.8	3.2	4.8	0.0	0.3	0
Use pharmacy software routinely when checking contraindications															
Yes	54.5	44.4	92.1	56.1	31.7	53.0	0.0	100.0	78.0	84.6	92.3	31.5	75.1	51.9	66.9
Missing	0.0	20.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	1.2	3.5	5.1	0.0	0.3	0.0
Clinical information about patients available via a shared database															
Yes	40.4	33.3	0.0	0.0	2.2	0.0	0.0	39.1	4.0	10.9	0.0	14.7	13.4	6.7	28.7
Missing	0.0	23.3	0.0	0.0	0.0	0.0	0.0	34.0	0.0	0.0	0.0	0.3	0.9	0.3	0.0
Clinical data about patients easily accessed															
Yes	49.5	26.3	63.4	56.6	38.7	0.0	3.5	41.8	46.9	5.4	37.4	51.5	25.9	32.9	34.2
Missing	0.0	36.7	0.0	0.0	2.2	0.0	0.3	67.9	4.7	12.8	2.2	13.4	14.2	0.3	28.7
Responding pharmacist participates in the following activities															
Health screening															
Yes	50.5	13.9	49.0	75.0	19.8	32.5	1.3	46.4	30.8	57.0	81.6	25.4	35.0	1.9	74.1
Missing	0.0	20.0	0.6	0.0	0.0	0.0	0.0	0.0	2.7	2.3	1.9	3.2	0.0	0.3	0.0

Patient monitoring															
Yes	44.4	9.7	52.0	19.6	15.0	42.2	0.0	18.2	26.4	62.8	28.9	30.1	46.0	4.0	66.9
Missing	0.0	20.0	1.0	0.0	0.0	0.0	0.0	0.0	1.3	1.6	3.2	3.2	0.0	0.3	0.0
Medication review															
Yes	53.5	37.5	65.1	11.2	12.3	13.4	0.0	94.3	66.0	29.4	41.8	68.3	60.1	10.2	64.6
Missing	0.0	20.0	0.4	0.0	0.0	1.2	0.0	0.0	2.0	3.5	3.1	2.1	0.0	0.3	0.0
Health promotion/education															
Yes	58.6	27.8	58.4	79.3	29.5	73.2	1.3	30.1	90.6	41.7	69.4	76.6	77.2	22.7	86.4
Missing	0.0	20.0	0.6	0.0	0.0	1.2	0.0	0.0	0.7	1.9	2.3	2.7	0.0	0.3	0.0

*In Spain: “Near to health centre”

Table 3 Respondents' scores for the modified BPCS across different European countries (2013)

Country	Total BPCS Score (Mean ± SD)	Direct Patient Care activities (Mean ± SD)	Referral and consultation activities (Mean ± SD)	Instrumental activities (Mean ± SD)
Bosnia	78.0 ± 10.6	29.4 ± 8.5	24.3 ± 2.5	24.3 ± 2.2
Denmark	75.6 ± 12.9	26.3 ± 12.8	28.7 ± 5.1	20.8 ± 2.7
Germany	72.1 ± 22.7	33.0 ± 16.5	20.4 ± 5.5	18.9 ± 3.9
Italy	57.3 ± 22.4	19.6 ± 14.8	17.0 ± 5.7	20.8 ± 6.0
Lithuania	60.4 ± 20.8	23.1 ± 14.9	16.7 ± 5.6	20.6 ± 4.9
Malta	75.6 ± 22.1	29.3 ± 16.0	22.6 ± 6.2	23.7 ± 4.2
Moldova	47.0 ± 2.1	13.4 ± 1.4	16.3 ± 1.3	17.3 ± 2.1
Netherlands*		34.8 ± 3		26.6 ± 3.3
N. Ireland	73.8 ± 20.7	29.2 ± 14.8	20.2 ± 5.2	24.1 ± 4.0
Norway	66.7 ± 20.1	25.1 ± 15.2	19.3 ± 4.6	22.5 ± 4.2
Portugal	77.3 ± 21.5	34.8 ± 15.1	20.5 ± 5.5	22.2 ± 4.7
Serbia	77.5 ± 25.5	32.1 ± 16.8	21.5 ± 6.6	24.0 ± 4.5
Spain	80.2 ± 14.8	30.8 ± 18.3	28.6 ± 5.7	20.4 ± 4.9
Sweden	63.2 ± 15.7	24.8 ± 11.1	18.3 ± 4.5	20.2 ± 4.0
Switzerland	82.7 ± 22.8	41.5 ± 16.5	20.0 ± 5.8	21.2 ± 4.2

*** Total score cannot be computed for the Netherlands, due to a missing item in the Referral and consultation activities survey**

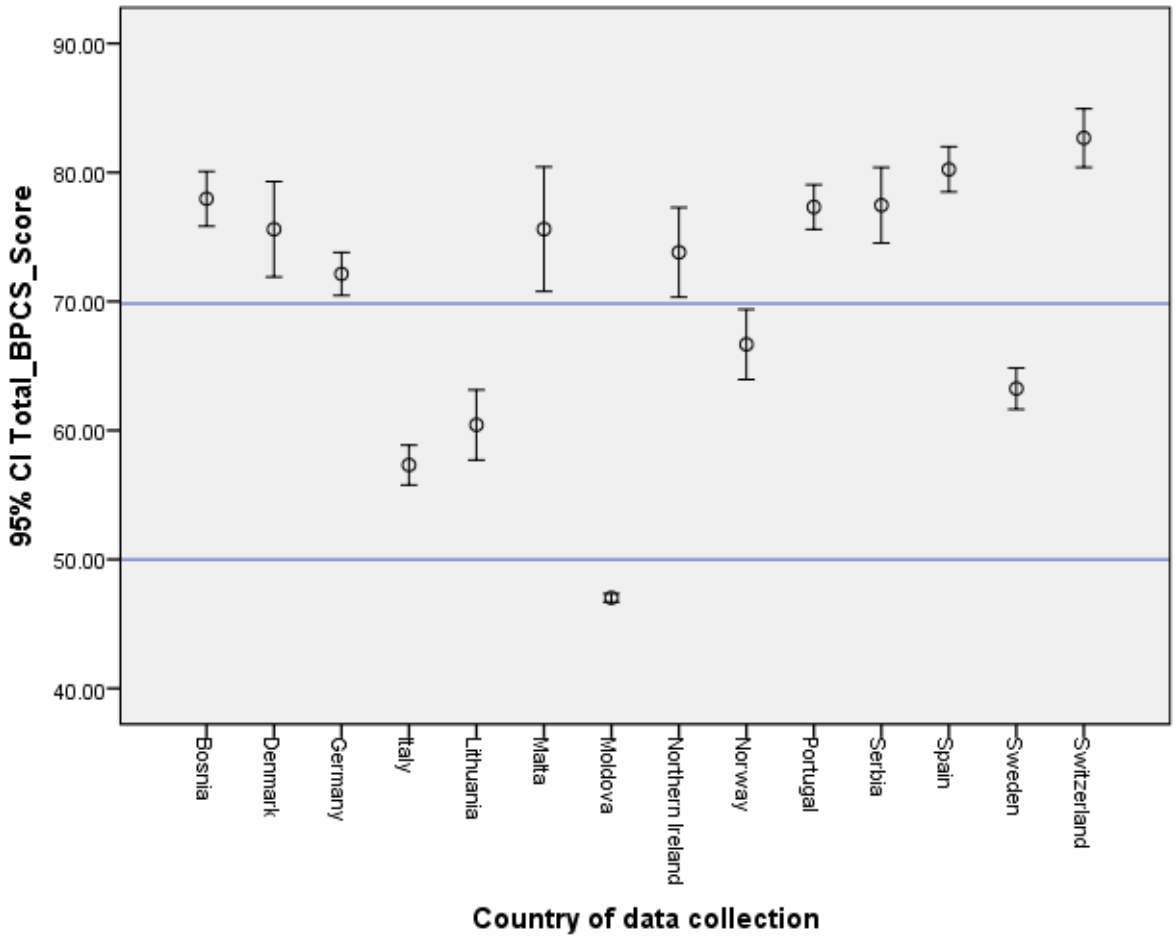

Figure 1 Total score for the modified BPCS across different European countries (2013)

Table 4 Summary of providers and non-providers of pharmaceutical care across the European countries surveyed (2013)

Country	Range of total BPCS score	Score range in individual country for providers (top 25%)	% of providers (top 25%) in individual country	Score range in individual country for non-providers (bottom 25%)	% of non-provider (bottom 25%) in individual country
Bosnia	46 – 127	106 – 127	1.0	46 – 66	8.2
Denmark	52 – 108	94 – 108	14.3	52 – 66	24.5
Germany	22 – 150	118 – 150	4.5	22 – 54	22.5
Italy	15 – 132	102 – 132	3.7	15 – 44	31.7
Lithuania	17 – 117	92 – 117	5.7	17 – 42	20.7
Malta	35 – 146	118 – 146	3.6	35 – 62	28.9
Moldova	41 – 55	52 – 55	7.4	41 – 44	30.3
N. Ireland	33 – 133	108 – 133	8.1	33 – 58	19.3
Norway	23 – 136	108 – 136	2.9	23 – 51	21.6
Portugal	30 – 143	115 - 143	5.2	30 – 58	19.3
Serbia	25 – 158	124 – 158	5.8	25 – 59	25.7
Spain	48 – 123	104 – 123	8.0	48 – 67	18.5
Sweden	21 – 117	93 – 117	4.3	21 – 45	12.8
Switzerland	15 – 136	105 – 136	17.4	15 – 46	5.9

* The Netherlands are not included in the table because the overall score could not be calculated

Table 5 Comparison of BPCS scores restricted to countries participating in both editions

Country overall BPCS score	**2006**	**2013**	**p-value***
Denmark	50.6	75.6	
Germany	70.8	72.1	
Malta	74.1	75.6	
Northern Ireland	74.0	74.1	
Portugal	76.5	77.5	
Sweden	62.9	63.2	
Switzerland	73.2	82.7	
Mean	**68.9**	**74.4**	**0.0376**

*Mann-Whitney test (1-tailed p-value)

Table 6 Final variables included in the linear regression model relating to total BPCS score across all

European countries surveyed in the current edition

Variable	B (Std. Error)	95.0% Confidence Interval for B	*p* value
(Constant)	47.903 (0.586)	46.755–49.051	<0.001
Participation in Medication review	9.901 (0.605)	8.716–11.086	<0.001
Routinely using pharmacy software to check clinical data	9.182 (0.589)	8.028–10.336	<0.001
Participation in Patient monitoring	7.663 (0.628)	6.432–8.894	<0.001
Routine Participation in local multi-disciplinary team meetings	6.821 (0.621)	5.605–8.038	<0.001
Participation in Health promotion/education	5.333 (0.575)	4.206–6.460	<0.001
Routinely using pharmacy software to check contraindications	3.611 (0.588)	2.458–4.763	<0.001
Having access to clinical data (either through shared database or being easily accessed)	2.823 (0.530)	1.784–3.862	<0.001
Having a postgraduate qualification in pharmacy practice/clinical pharmacy	2.922 (0.639)	1.670–4.174	<0.001
Having a high prescription volume	0.005 (0.001)	0.002–0.007	<0.001
Pharmacy with a private consultation area	1.787 (0.600)	0.611–2.963	0.003